SECTION 65

AIR CONDITIONING REFRIGERATION EQUIPMENT

65.1 REFERENCES

(65A) AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI), Standard 210/240-89

(65B) AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI), Standard 270-84

(65C) AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI), Standard 520

(65D) ANSI/ASHRAE 15 safety code (latest revision)

65.2 INTRODUCTION

This Section contains the Contractor Design and Provide general requirements for the air conditioning refrigeration equipment systems.

For WSF Fleet-wide Standardization purposes, End No. 1 of the Vessel shall always be considered the bow, and this designation shall delineate port and starboard, fore and aft wherever they are addressed in the Technical Specification.

65.3 GENERAL

Cooling for the air conditioning systems serving the ***Pilothouse areas***, the ***Crew Quarters***, the ***Officer Quarters***, and the ***EOS/Workshop area*** shall be provided by individual, direct expansion type condensing units. Condensing units located above the Lower Vehicle Deck (LVD) shall be air cooled. Condensing units located below the LVD shall be fresh water cooled. Unless approved otherwise in writing by the WSF Representative, all condensing units shall operate on the same EPA approved refrigerant that is supportable as set forth in Section 12 of the Technical Specification.

NOTE: For the purposes of HVAC system design, the "***EOS/Workshop area***", "***Pilothouse areas***", "***Crew Quarters***", and "***Officer Quarters***" shall be defined as set forth in the ***GENERAL*** Subsection in Section 12 of the Technical Specification.

The "***Crew Quarters***" and "***Officer Quarters***" make up a "***Crew Accommodation Block***" on the Sun Deck, around the Midpoint area, Port and Stbd, of that deck.

See Section 74 of the Technical Specification for general piping and material requirements and Section 75 of the Technical Specification for insulation and lagging requirements.

65.4 REFRIGERATION MACHINERY

A total of five (5) air conditioning condensing units shall be provided.

One (1) air-cooled direct expansion condensing unit shall serve the ***Pilothouse area*** at End No. 1. One (1) air-cooled direct expansion condensing unit shall serve the ***Pilothouse area*** at End No. 2. One (1) air-cooled direct expansion condensing unit shall serve the ***Crew Quarters*** at End No. 2. One (1) air-cooled direct expansion condensing unit shall serve the ***Officer Quarters*** at End No. 1. These air-cooled direct expansion condensing units shall be OCEAN BREEZE Model ARR, or equal, constructed of marine grade stainless steel with splash proof intake and discharge, high efficiency triple treated marine condenser coil, units shall be fully isolated and mounted for minimum vibration, with gage package, liquid line sight glass, and copper fin coils.

One (1) water-cooled direct expansion condensing unit shall serve the ***EOS/Workshop area*** of the Vessel. This unit shall be a CARRIER "Seahorse" Model 90YD28BSH4BA6C1R, or equal, semi-hermetic unit with gage package, liquid line sight glass. For the purposes of minimizing noise levels in the EOS/Workshop area, and also to keep the refrigerant liquid and suction lines as short as possible, locate the condensing unit in Engine Room No. 2, outboard on the starboard side upper deck (14'-0" level) near the Engineer's Starboard Storeroom boundary bulkhead. See the *General Arrangements* Subsection in Section 50 of the Technical Specification for 14'-0" level requirement.

Each condensing unit shall be pre-packaged with compressor, condenser and interconnecting piping all on a single skid. Compressors shall be of the semi-hermetic type, resiliently mounted to the skid using vibration isolator type mounts. Air-cooled condensers shall be copper tube/copper fin. Water-cooled condensers shall be shell and tube type.

The HVAC control computer shall be capable of starting, stopping, and resetting each air conditioning refrigeration unit, temperature control, and monitoring of all unit temperatures and pressures. Each compressor shall be fitted with five (5) minute recycle protection to prevent compressor short cycling.

65.5 QUALITY ASSURANCE

Air-cooled units shall be rated in accordance with References (65A) and (65B). Water-cooled units shall be rated in accordance with Reference (65C).

Unit construction shall comply with Reference (65D) and comply with NEC.

Condensing units shall be constructed in accordance with UL 1995 Standard and shall carry the UL label of approval.

Unit cabinets shall be capable of withstanding Federal Test Method Standard (U.S.A.) No.141 (method 6061) 500-hour salt spray test.

65.6 CLEANING AND FLUSHING

Prior to installation, all refrigeration piping shall have all foreign or loose particles removed and shall be thoroughly cleaned and degreased to manufacturer’s recommendations, and as set forth in Section 74 of the Technical Specification. Upon completion of the cleaning operation, all open ends shall be tightly plugged or capped (see Section 74 of the Technical Specification). Open ends shall be kept closed until final installation. Condensers, coolers, compressors and other pieces of equipment that have been opened shall be inspected and, if necessary, cleaned.

After installation and before system is put into operation, the refrigerant circuit shall be thoroughly cleaned and flushed internally with a manufacturer’s approved fluid and procedure utilizing the temporary installation of a dirt interceptor; and as set forth in Section 74 of the Technical Specification. After installation and leak testing, and before charging with refrigerant, the system shall be purged and dehydrated by a vacuum method.

65.7 SPARE PARTS AND INSTRUCTION MANUALS

Provide a list of recommended spare parts and special tools for those items which are Contractor furnished, together with parts lists and instruction manuals necessary to maintain

and service provided equipment and accessories in accordance with the requirements of Sections 86 and 100 of the Technical Specification.

In addition, provide the spares listed in **TABLE 65-1** below:

TABLE 65-1 **Additional Spare Parts/Tools Description**	**Quantity**
Spare charge of refrigerant for the system (each Vessel)	1 ea.
Spare charge of lubricating oil for the system (each Vessel)	1 ea.
Electronic leak detector (for testing system / media provided) (first Vessel Only)	1
Manifold (Service) gages (first Vessel only)	1
System evacuation pump (first Vessel only)	1

NOTE: The spare charges of refrigerant and lubricating oil shall be equal to those required for the **largest** system on the Vessel.

65.8 TESTS, TRIAL AND INSPECTIONS

Tests and/or trials shall be provided in accordance with this Section and Section 101 of the Technical Specification.

Inspections shall be performed as defined in this Section and Section 1 of the Technical Specification.

65.9 PHASE II TECHNICAL PROPOSAL REQUIREMENTS

The following diagram and calculations, in addition to other deliverables required by Section 100 of the Technical Specification and the Authoritative Agencies, shall be provided during the Phase II Technical Proposal stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

A. Preliminary Air Conditioning Condensing Unit Sizing Calculations

See Section 100 of the Technical Specification for additional requirements regarding technical documentation.

65.10 PHASE III DETAIL DESIGN AND CONSTRUCTION REQUIREMENTS

The following drawings, calculations and report, in addition to other deliverables required by Section 100 of the Technical Specification and the Authoritative Agencies shall be provided during the Construction stage of Work in accordance with the requirements of Section 100 of the Technical Specification:

A. Air Conditioning Condensing Unit Sizing Calculations

See Section 100 of the Technical Specification for additional requirements regarding technical documentation.

(END OF SECTION)